

Rec'd PCT/PTO 28 SEP 2004

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 October 2003 (02.10.2003)

PCT

(10) International Publication Number  
**WO 03/080359 A1**

- (51) International Patent Classification<sup>7</sup>: **B41M 5/035, D06P 5/00**
- (21) International Application Number: **PCT/EP02/03687**
- (22) International Filing Date: 27 March 2002 (27.03.2002)
- (25) Filing Language: English
- (26) Publication Language: English
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A1  
WO 03/080359

(54) Title: PROCESS FOR THE TREATMENT OF TRANSFER PRINTED PAPER AND THE PRINTED PAPER THUS OBTAINED

(57) Abstract: An application process is described of a polymeric carrier consisting of at least one thermoplastic polymer based on polyester or copolyester on sublimatic transfer printed paper and the transfer printed paper thus obtained. The fundamental advantage of the above process consists in the possibility of using, in the printing of vegetable fibres, existing technologies and paper currently used for the printing of polyester fabrics.

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10/509289  
DT04 Rec'd PCT/PTO 23 SEP 2004

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PROCESS FOR THE TREATMENT OF TRANSFER PRINTED PAPER AND  
THE PRINTED PAPER THUS OBTAINED

The present invention relates to a treatment process  
10 of transfer printed paper and the transfer printed paper  
thus obtained.

A sublimatic printing process whereby it is possible  
to print polyester fabrics with excellent results, has  
been known and widely used for some time. Specific  
15 printed paper with sublimatic colours, called "transfer  
printed paper" is used, which when put in close contact  
in a hot calender with polyester fabrics, accurately re-  
leases the colours present on the paper onto the fabric,  
thus allowing the exact print present on the paper to be  
20 repeated.

This paper is based on the sublimation principle of  
the dye which is absorbed by the fibre of polyester fab-  
ric.

This printing system is currently only used for  
25 polyester fabrics, as other textile fibres, due to their

incapacity to absorb dispersed or plasto-soluble dyes used in transfer printed paper, cannot be printed.

Polyamide fibres (nylon) are capable of only partially receiving dyes and can therefore only be used in a 5 minimum percentage.

It is impossible, on the other hand, to effect the colouring of cellulose fibres with this technique.

Sublimatic printing processes are extremely ecological printing processes, which are easy to apply without 10 costly equipment and particular design precision. For these reasons they have obtained great commercial success in the last few years.

It has been estimated in fact that in Europe alone, about 500 million m<sup>2</sup> of polyester fabric are printed with 15 this system called "Sublimatic Transfer Printing".

Various studies and attempts have therefore been effected to try and discover how to use the sublimatic process and specific transfer printed paper in the printing of vegetable fibres such as cotton, linen, etc.

20 Attempts have been made, for example, to treat cotton with special polymers or using various dyes in paper printing, but so far there has been no success in obtaining a printing process and cotton, or vegetable fibre in general, with interesting qualitative and commercial 25 characteristics.

The objective of the present invention is to identify a treatment of paper already printed with sublimatic colours, i.e. of transfer printed paper, which makes it suitable for the sublimatic printing of vegetable fibres 5 (cellulose) and mixed fibres, consequently overcoming the limits which characterize the known art.

An object of the present invention therefore relates to an application process of a polymeric carrier consisting of at least one thermoplastic polymer based on polyester or copolyester to sublimatic transfer printed paper. 10

A further object of the present invention relates to sublimatic transfer printed paper to which a polymeric carrier consisting of at least one thermoplastic polymer 15 based on polyester or copolyester, has been applied.

The fundamental advantage of the process according to the present invention lies in the fact that it makes it possible to use, in the printing of vegetable fibres, existing technologies and paper currently adopted for the 20 printing of polyester fabrics.

In particular, the application process of a polymeric carrier consisting of at least one thermoplastic polymer based on polyester or copolyester to sublimatic transfer printed paper, can be effected by melting, coupling, coating or sintering. 25

Application by the melting of the polymeric carrier to the sublimatic transfer printed paper can be carried out by means of bubble extrusion, in a flat head or in a calender.

5 Application by the coupling of the polymeric carrier to the sublimatic transfer printed paper can be carried out by the coupling of a previously formed film.

Application by the coating of the polymeric carrier to the sublimatic transfer printed paper can be carried 10 out by means of the rotogravure, roll revers, etc. of solutions of said polymeric carrier.

As indicated above, the dyes printed on the transfer paper belong to the chemical group of dyes called dispersed or plasto-soluble dyes.

15 The polymeric carrier consists of polyester and co-polyester thermoplastic polymers.

In particular, the polymeric carrier consists of polyester and copolyester thermoplastic polymers having a melting point ranging from 80 to 150°C. The melting 20 points preferably range from 110 to 130°C.

The polyester and copolyester thermoplastic polymers are preferably obtained by the reaction of aromatic and/or aliphatic dicarboxylic acids with aliphatic and/or cyclic bifunctional glycols.

25 The aromatic and/or aliphatic dicarboxylic acids are

preferably selected from isophthalic acid, terephthalic acid, their anhydrides and/or their esters, phthalic anhydride, sebacic acid, azaleic acid, adipic acid, etc.

In particular, the esters are preferably methyl esters.

The aliphatic and/or cyclic bifunctional glycols are preferably selected from butanediol, ethanediol, propanediol, hexanediol, neopentylglycol and polyols such as polypropyleneglycol and polytetramethyleneglycol, etc.

In particular, polypropyleneglycol has a molecular weight ranging from 500 to 1000 and polytetramethyleneeglycol has a molecular weight ranging from 1000 to 2000.

The process according to the present invention consequently allows printed dyes to be transferred onto transfer printed paper, vegetable and mixed fibres under the same conditions adopted for the normal sublimatic printing of polyester fibres.

An object of the present invention also relates to the use of the transfer printed paper obtainable with the process according to the present invention, for the sublimatic printing of fabrics and/or vegetable and/or mixed fibres, in particular cotton or linen fabrics and/or fibres.

The present invention also relates to a fabric or

vegetable and/or mixed fibre, printed by means of a sublimatic printing process with the transfer printed paper obtainable with the process according to the present invention.

5       The characteristics and advantages of the process and transfer printed paper according to the present invention, can be better understood from the following detailed and illustrative description, referring to the following examples.

10     EXAMPLE 1

15.5 kg of dimethylterephthalate, 15.5 kg of dimethylisophthalate, 41.4 kg of 1,4-butanediol and 0.125 kg of catalyst were charged into a reactor.

The mixture was then stirred and heated, by means of 15 thermal oil exchangers, to a temperature of 245°C for an hour and a half. After distilling the methanol formed, 8.14 kg of sebacic acid were added. The reaction was then put under vacuum at a pressure of 120 mmHg and left to react for a further hour. The pressure was subsequently 20 further reduced to 1 mmHg and the mixture was brought to 260°C for two hours.

After distilling the water from the reactor, the non-reacted 1,4-butanediol and possible tetrahydrofuran formed by cyclization of the 1,4-butanediol, a polymer 25 is obtained, having an intrinsic viscosity equal to 0.735

and a crystalline melting point equal to 110°C.

EXAMPLE 2

The same procedure is adopted as described in Example 1 with the only difference that the sebacic acid is  
5 substituted with 7.8 kg of azaleic acid.

The polymer thus obtained has an intrinsic viscosity equal to 0.715 and a crystalline melting point equal to 108°C.

The polymers obtained according to one of the above  
10 examples are then reduced to granules and applied to the paper by means of the equipment and processes previously indicated, thus allowing sublimatic prints to be effected on vegetable and mixed fibres which otherwise could not be printed with this technique.

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CLAIMS

1. An application process of a polymeric carrier consisting of at least one thermoplastic polymer based on 5 polyester or copolyester to sublimatic transfer printed paper.
2. The process according to claim 1, characterized in that the application of the polymeric carrier to the transfer printed paper is effected by means of melting, 10 coupling, coating or sintering.
3. The process according to claim 2, characterized in that the application by melting is effected by means of bubble extrusion plants, in a flat head or in a calender.
4. The process according to claim 2, characterized in 15 that the application by coupling is effected by the coupling of a previously formed polymeric film.
5. The process according to claim 2, characterized in that the application by coating is effected by means of a rotogravure, roll revers, etc. of solutions of the poly- 20 meric carrier.
6. The process according to claim 2, characterized in that the application by sintering is effected by the sintering of powders.
7. The process according to any of the previous claims, 25 characterized in that the polymeric carrier consists of

polyester and copolyester thermoplastic polymers having melting points ranging from 80 to 150°C.

8. The process according to claim 7, characterized in that the melting points range from 110 to 130°C.

5 9. The process according to any of the previous claims, characterized in that the polymeric carrier consists of polyester and copolyester thermoplastic polymers obtained by the reaction of aromatic and/or aliphatic dicarboxylic acids, their anhydrides and/or their esters, with ali-  
10 phatic and/or cyclic bifunctional glycols.

10. The process according to claim 9, characterized in that the aromatic and/or aliphatic dicarboxylic acids and/or their anhydrides and/or their esters are selected from isophthalic acid, terephthalic acid, their anhy-  
15 drides and/or their esters, phthalic anhydride, sebacic acid, azaleic acid, adipic acid.

11. The process according to claim 10, characterized in that the esters are methyl esters.

12. The process according to claim 9, characterized in  
20 that the aliphatic and/or cyclic bifunctional glycols are selected from butanediol, ethanediol, propanediol, hex-  
anediol, neopentylglycol and polyols such as polypropylene-  
neglycol and polytetramethyleneglycol.

13. The process according to claim 12, characterized in  
25 that the polypropyleneglycol has a molecular weight rang-

ing from 500 to 1000 and the polytetramethyleneglycol has a molecular weight ranging from 1000 to 2000.

14. Sublimatic transfer printed paper to which a polymeric carrier consisting of at least one thermoplastic 5 polymer based on polyester or copolyester, has been applied.

15. Sublimatic transfer printed paper obtainable by means of the process according to any of the previous claims from 1 to 13.

10 16. The printed paper according to claim 15, characterized in that the dyes printed on the paper belong to the chemical group of dyes called dispersed or plasto-soluble dyes.

17. Use of the transfer printed paper according to any 15 of the claims from 14 to 16, for the sublimatic printing of fabrics and/or vegetable and/or mixed fibres.

18. The use according to claim 17, characterized in that the fabric and/or fibre is cotton or linen.

19. A fabric or vegetable and/or mixed fibre printed by 20 means of a sublimatic printing process with the transfer printed paper according to one of the claims from 14 to 16.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/03687

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 B41M5/035 D06P5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 D06P B41M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 576 610 A (DONENFELD HENRY) 18 March 1986 (1986-03-18) example 1 claim 1 ---	1-5,7-19
A	DE 28 32 265 A (CIBA GEIGY AG) 8 February 1979 (1979-02-08) claims ---	1-19
A	US 4 063 879 A (FAULHABER GERHARD ET AL) 20 December 1977 (1977-12-20) claim 1 ---	1-19
A	GB 1 566 280 A (ICI LTD) 30 April 1980 (1980-04-30) claims ---	1-19
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## \* Special categories of cited documents :

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Date of the actual completion of the international search

27 November 2002

Date of mailing of the international search report

05/12/2002

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/03687

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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